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Patient Health Information Shared Electronically by Office-based Physicians: United States, 2015

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Abstract

Objective—This report expands upon previous research that described the percentage of physicians who electronically sent, received, integrated, and searched for patient health information (PHI) by describing types of PHI that are electronically shared in physician offices.

Methods—Data are from the 2015 National Electronic Health Records Survey (NEHRS), a nationally representative mixed-mode survey of nonfederal, office-based physicians that collects information on physician and practice characteristics, including the adoption and use of electronic health record (EHR) systems. Estimates of the types of PHI shared electronically are described according to whether physicians electronically sent, received, integrated, or searched for PHI.

Results—In 2015, among office-based physicians who sent PHI electronically, the most commonly observed types of PHI sent were referrals (67.9%), laboratory results (67.2%), and medication lists (65.1%). Among physicians who received PHI electronically, the most commonly observed types of PHI received were laboratory results (78.8%), imaging reports (60.8%), and medication lists (54.4%). For physicians who integrated PHI electronically, the most commonly observed types of PHI integrated were laboratory results (73.2%), imaging reports (49.8%), and hospital discharge summaries (48.7%). Finally, a large majority of physicians who searched for PHI electronically did so for medication lists (90.2%), medication allergy lists (88.2%), and hospital discharge summaries (80.4%).

Conclusion—This report provides the first national estimates for types of PHI that are electronically sent, received, integrated, and searched for by physicians with EHR systems, and could be used as a benchmark for future studies.

Keywords: EHR • electronic health records • health information technology • interoperability • National Electronic Health Records Survey

Introduction

Electronic health records (EHRs) have the advantage of providing accurate and complete information about patients, reducing health care costs, and enhancing privacy and security of patient data (1). EHRs also allow physicians to obtain access to current medication lists, allergies, and laboratory results, which may facilitate quality of care (1). The Health Information Technology for Economic and Clinical Health Act provides financial incentives to eligible providers using a certified EHR system, and providers who can demonstrate meaningful use of this certified system (2,3). In 2010, the Office of the National Coordinator for Health Information Technology (ONC) began certifying EHR systems based on their ability to meet the meaningful use criteria. In 2015, a federal plan to support information sharing and enhance the country's health information technology infrastructure was published (4,5). In 2015, 77.9% of office-based physicians had a certified EHR system, up from 74.1% in 2014 (4–6).

Data from the National Electronic Health Records Survey (NEHRS) can be used to make national and state-based estimates of various characteristics of EHR adoption and use by office-based



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physicians. Using data from the 2015 NEHRS, previous research described the extent to which office-based physicians electronically sent, received, integrated, and searched for patient health information (PHI) (6). Collectively, these four domains of interoperability (see [Technical Notes](#) for definition) have been identified by ONC as important for enabling nationwide interoperability, and meeting the U.S. Congress-declared objective of widespread health information exchange through certified EHRs (4,7). Previous results showed that in 2015, nationally, 38.2% of office-based physicians electronically sent PHI, while 38.3% electronically received PHI (6). Nationally, 31.1% of office-based physicians electronically integrated PHI, and 34.0% electronically searched for PHI. Only 8.7% of office-based physicians performed all four of these actions (6).

While these findings provide information on the extent to which all office-based physicians electronically sent, received, integrated, and searched for PHI (6), they do not provide detail or description of the types of PHI that are electronically shared in physician offices. As such, this report expands upon information about types of PHI by describing the types that are electronically sent, received, integrated, and searched for in physician offices. Therefore, the estimates shown in this report are not for all office-based physicians, but only for those office-based physicians who reported engaging in at least one of the four aspects of interoperability.

Methods

Data source

Estimates are from data collected in the 2015 NEHRS, which is conducted by the National Center for Health Statistics (NCHS) and sponsored by ONC. NEHRS is a nationally representative mixed-mode survey of office-based physicians that collects information on physician and practice characteristics, including the adoption and use of EHR systems. The NEHRS sampling design allows for both national and state-based estimates

of EHR adoption and use. NEHRS is conducted annually as a sample survey of nonfederal, employed, office-based physicians who are primarily engaged in direct patient care. Physicians in the specialties of anesthesiology, radiology, and pathology are excluded from the survey. The 2015 NEHRS has a sample of 10,302 physicians, and is designed to produce national and state-based estimates of office-based physicians. Data collection took place from August through December 2015 and used a sequential mixed-mode design to collect data through web, mail, and telephone modes (8). The overall unweighted response rate of the 2015 NEHRS questionnaire was 51.9% (49.2% weighted). A copy of the questionnaire is available from the NCHS website: https://www.cdc.gov/nchs/data/ahcd/2015_NEHRS.pdf. Data from the 2015 NEHRS are available through the NCHS Research Data Center (<https://www.cdc.gov/rdc/index.htm>).

Definitions and measures

The 2015 NEHRS asked about four aspects of interoperability: sending, receiving, integrating, and searching for PHI electronically. Physicians who electronically *sent* PHI were defined as the 1,301 physician respondents who answered either “both send and receive electronically” or “send electronically only” to at least one of the eight different types of PHI provided in the survey question, “For other providers outside of your medical organization including public health agencies, do you electronically send and receive, send only, or receive only the following types of patient health information?” Among these physicians, the eight types of PHI estimated include: medication lists, patient problem lists, medication allergy lists, imaging reports, laboratory reports, registry data, referrals, and summary of care records for transitions of care or referrals.

Physicians who electronically *received* PHI were defined as the 1,525 respondents who answered either “both send and receive electronically” or “receive electronically only” to at least 1 of the 10 different types of PHI provided in the survey question previously

mentioned. It should be noted that for the same survey question, there were 10 types of PHI listed as responses for electronically receiving, but only 8 types of PHI for electronically sending. This is because two of the responses (hospital discharge summaries and emergency department [ED] notifications) apply to hospital-based information that is not applicable to office-based physicians. Among these physicians, the 10 types of PHI received for which estimates are provided include: medication lists, patient problem lists, medication allergy lists, imaging reports, laboratory reports, registry data, referrals, hospital discharge summaries, ED notifications, and summary of care records for transitions of care or referrals.

Physicians who electronically *integrated* PHI were defined as the 959 physician respondents who answered “yes” to integrating at least 1 of 10 different types of PHI provided in the survey question, “When electronically receiving information from other providers, are you able to integrate the following types of patient health information into your EHR without special effort like manual entry or scanning?” This definition is consistent with that used in previous research (6). Among these physicians, the 10 types of PHI for which estimates are provided include: medication lists, patient problem lists, medication allergy lists, imaging reports, laboratory reports, registry data, referrals, hospital discharge summaries, ED notifications, and summary of care records for transitions of care or referrals.

Finally, physicians who electronically *searched* for PHI were defined as the 1,335 physician respondents who selected at least one of the six different types of PHI listed in the survey question, “What type of patient health information do you routinely search for from sources outside your medical organization?” Among these physicians, the six types of PHI for which estimates are provided include: laboratory results, patient problem lists, imaging reports, medication lists, medication allergy lists, and hospital discharge summaries.

Data analyses

All data analyses were performed using the statistical package SUDAAN software version 11.0.1 (9). Analyses were weighted using NEHRS survey weights to allow for generalization to nonfederal, office-based physicians in the United States. Survey design and appropriate subsetting techniques were incorporated to account for covariance resulting from the sample design of NEHRS. For sending, receiving, and integrating information, the three most and least commonly observed types of PHI were described in the text. All results are described for searching information, as there are only six categories for that aspect of interoperability. All estimates presented meet the NCHS standards for presentation of proportions (10).

Results

Sending patient health information electronically

In 2015, of those office-based physicians who sent PHI electronically, the most commonly observed types

of PHI sent were referrals (67.9%), laboratory results (67.2%), and medication lists (65.1%) (Figure 1). The three least commonly observed types of PHI sent by physicians who electronically sent PHI were summary of care records (51.5%), registry data (55.9%), and imaging reports (56.6%).

Receiving patient health information electronically

In 2015, among those office-based physicians who received PHI electronically, the three most commonly observed types were laboratory results (78.8%), imaging reports (60.8%), and medication lists (54.4%), followed closely by referrals (54.3%) (Figure 2). In contrast, the least commonly observed types of PHI electronically received from other health care providers included ED notifications (34.5%), hospital discharge summaries (42.5%), and registry data (43.2%).

Integrating patient health information electronically

Among office-based physicians who integrated PHI electronically, the three most commonly observed integrated types were laboratory results (73.2%), imaging reports (49.8%), and hospital discharge summaries (48.7%) (Figure 3). Among these physicians, the least commonly observed integrated types of PHI included registry data (30.9%), problem lists (32.7%), and medication allergy lists (36.1%).

Searching for patient health information electronically

Finally, for office-based physicians who searched for PHI electronically, the most commonly observed types included medication lists (90.2%), medication allergy lists (88.2%), and hospital discharge summaries (80.4%), followed by imaging reports (58.9%), laboratory results (48.5%), and problem lists (41.2%) (Figure 4).

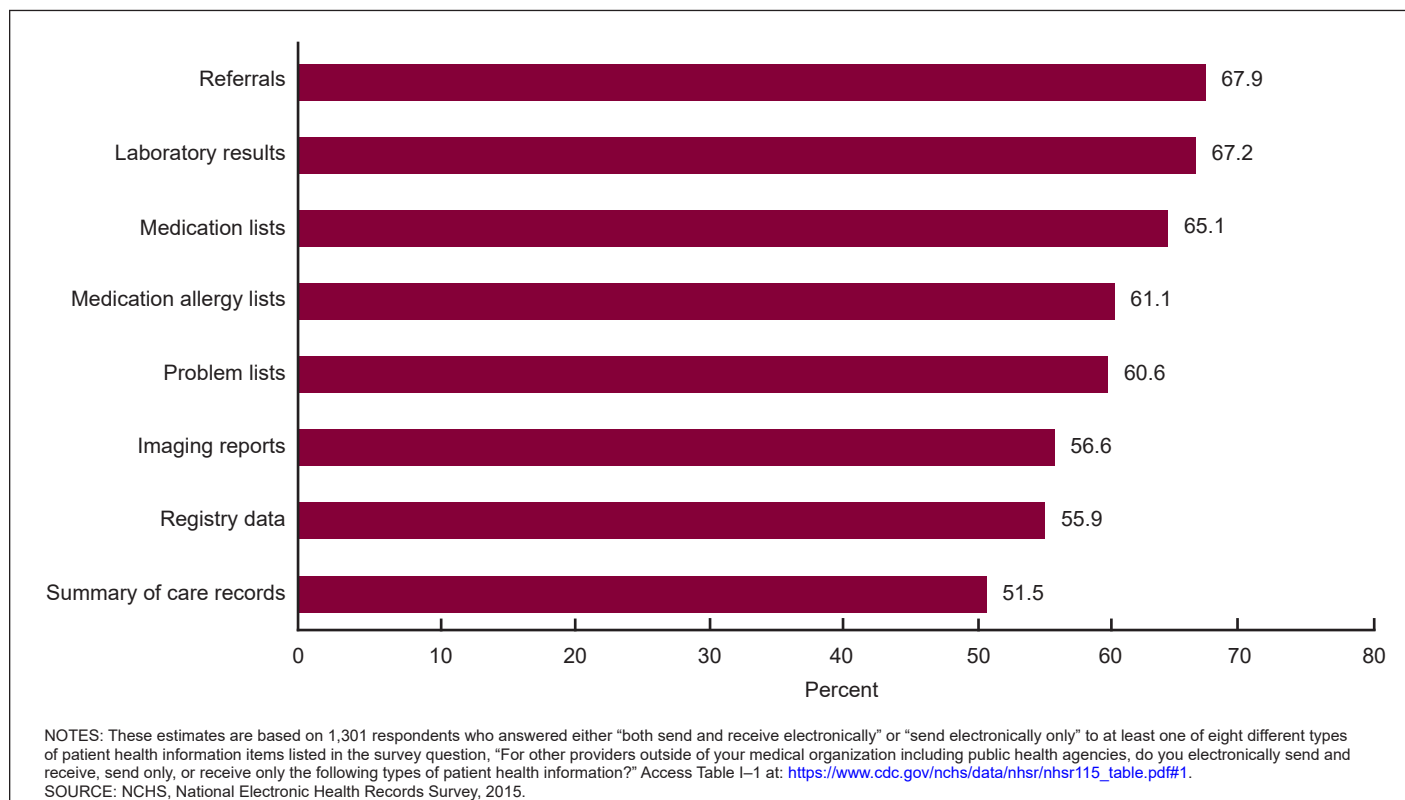


Figure 1. Type of patient health information sent electronically by office-based physicians: United States, 2015

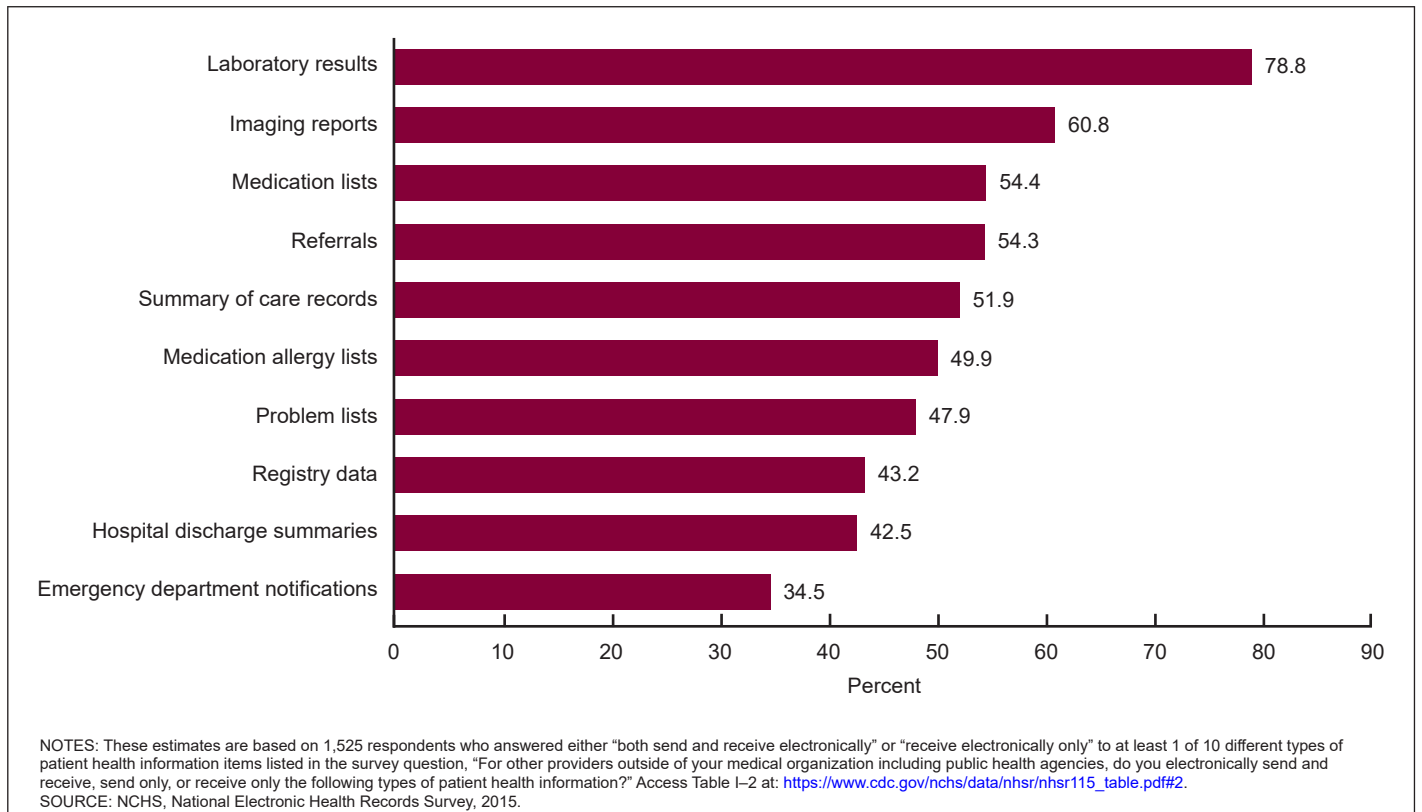


Figure 2. Type of patient health information received electronically by office-based physicians: United States, 2015

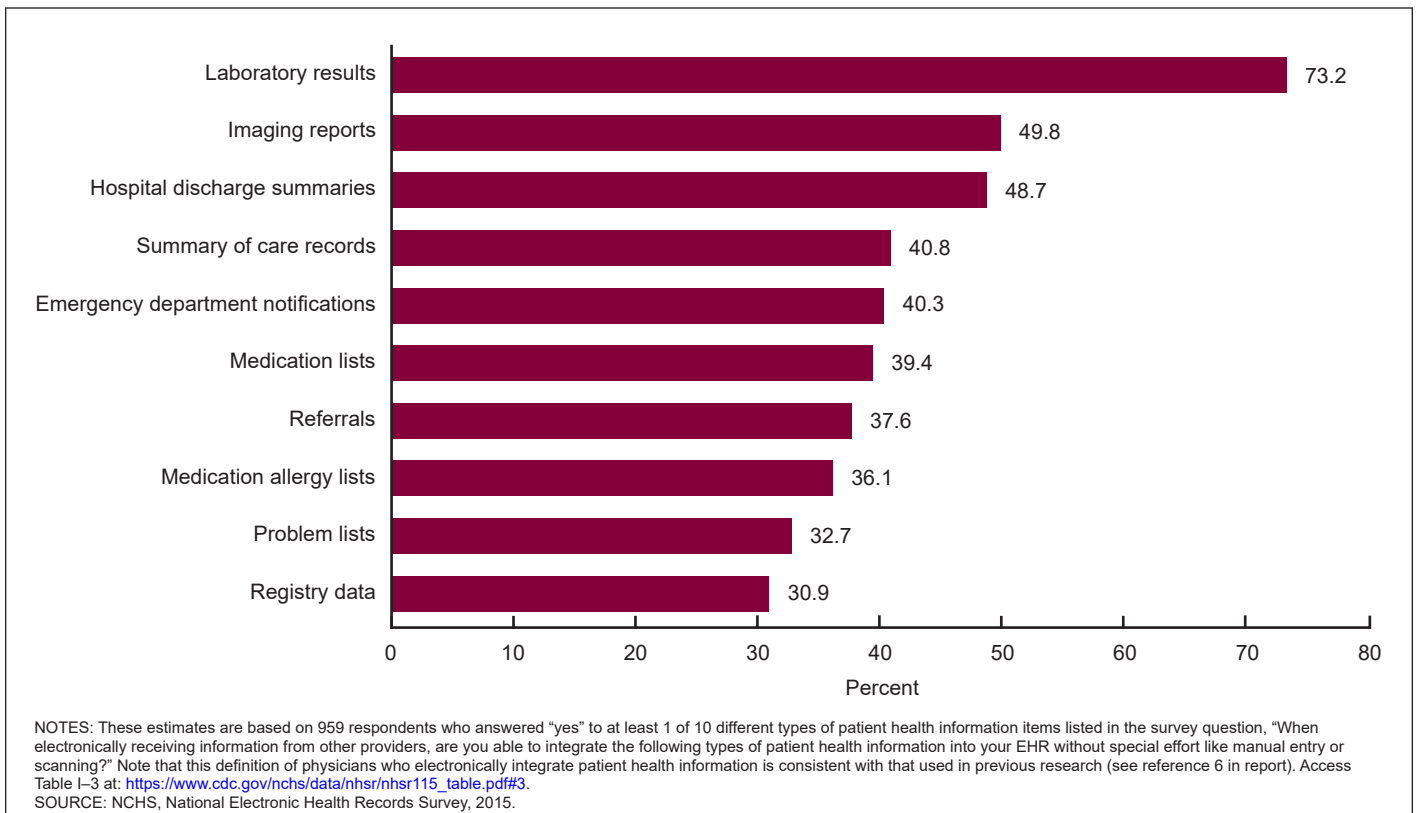


Figure 3. Type of patient health information integrated electronically by office-based physicians: United States, 2015

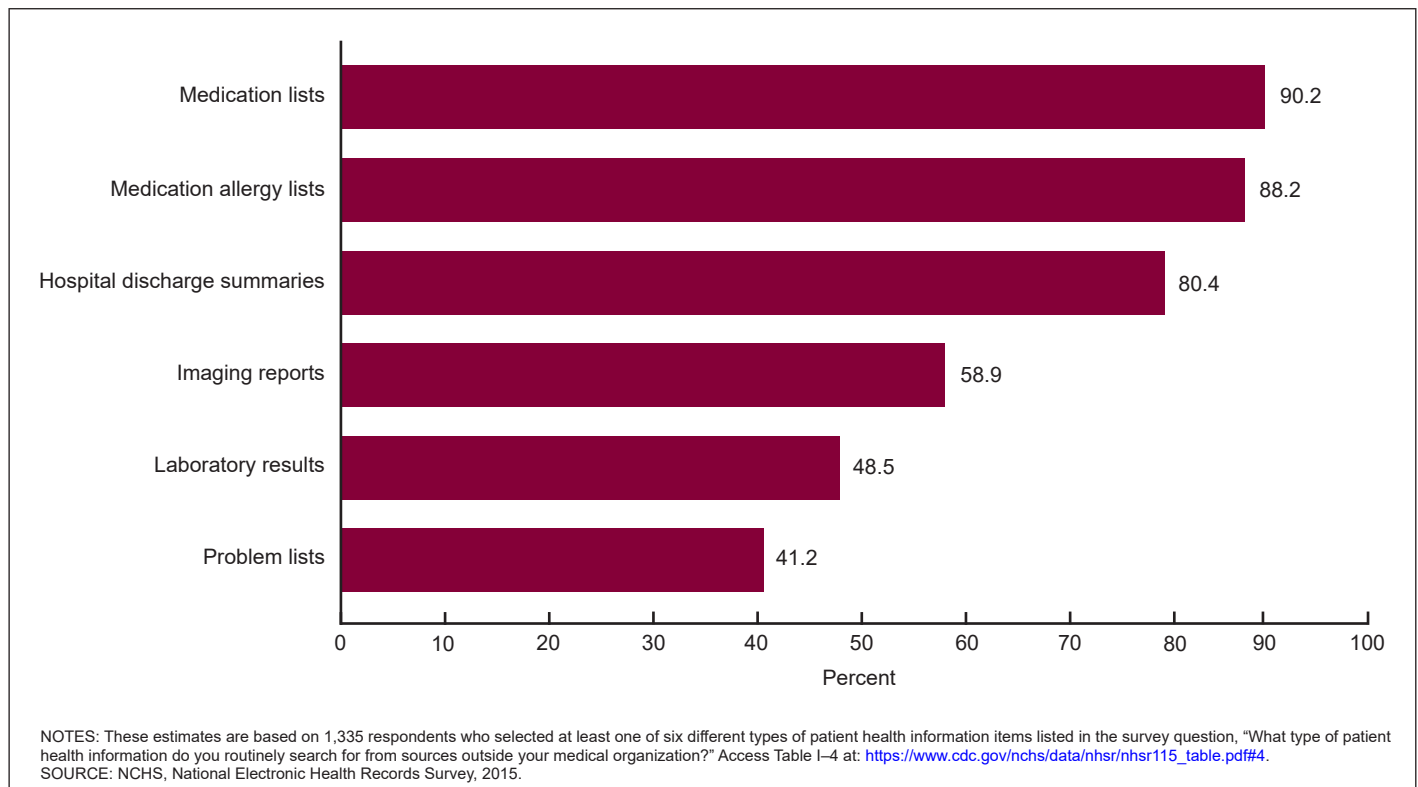


Figure 4. Type of patient health information searched for electronically by office-based physicians: United States, 2015

Summary

Multiple studies have reported the benefits of using EHR systems in the United States (1,11,12). In addition, surveys such as NEHRS (6,8), the American Hospital Association Annual Survey Information Technology Supplement (7), and others focusing on establishments such as skilled nursing facilities (13) have been used to generate estimates of EHR adoption and interoperability. Although these estimates are becoming more widely available, there is limited information on the specific types of PHI that are electronically sent, received, integrated, and searched for by physicians with EHR systems. Having this information is a next step for research on EHR interoperability (6–8,13) because it provides insight into the type of PHI electronically shared among office-based physicians who sent, received, integrated, or searched for PHI electronically in 2015.

For example, the results show that one of the most common types of shared PHI was laboratory results, sent by 67.2% of physicians who electronically sent PHI, received by 78.8% of physicians

who electronically received PHI, and integrated by 73.2% of physicians who electronically integrated PHI. Contrarily, registry data were found to be one of the least commonly shared types of PHI, only sent by 55.9% of physicians who electronically sent PHI, received by 43.2% of physicians who electronically received PHI, and integrated by 30.9% of physicians who electronically integrated PHI.

Previous studies have found that both primary care physicians and specialists regard different aspects of EHRs as pertinent, which has an impact on their willingness to share PHI (14,15). Therefore, future research could also examine differences by physician and practice characteristics in the types of PHI sent, received, integrated, and searched for. Examining differences in the electronic sharing of PHI type by physician specialty, office setting, practice size, and EHR system (or vendor) could provide details that build on the findings in this report.

These are the first national estimates of PHI type according to the aspects of interoperability among physicians with EHR systems, and these estimates

can potentially be used as a benchmark for future studies. Combined with measures of electronic sharing of PHI by physicians, information on the specific type of PHI shared electronically among office-based physicians will assist in tracking progress outlined in the federal plan for achieving interoperability (4,5).

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Technical Notes

Definition of interoperability

In the 21st Century Cures Act (PL.114–255), interoperability is defined in section 4003(a) as health information technology that “(A) enables the secure exchange of electronic health information with, and use of electronic health information from, other health information technology without special effort on the part of the user; (B) allows for complete access, exchange, and use of all electronically accessible health information for authorized use under applicable state or federal law; and (C) does not constitute information blocking as defined in section 3022(a) [of PL.114–255].”

Supplemental estimates

The estimates presented in this report used a similar approach to define physicians who electronically send, receive, integrate, and search for patient health information (PHI). For each of the four aspects of interoperability, estimates were generated among physicians who answered “yes” to any type of PHI for each of the respective aspects. However, previous research using 2015 National Electronic Health Records Survey data has used alternate definitions for physicians who electronically send, receive, and search for PHI (6). These alternate definitions are as follows:

- Physicians who electronically send PHI were defined as those who answered “yes” to either the “EHR (not eFax)” or “Web Portal (separate from EHR)” methods when asked, “Do you send patient health information to other providers and public health agencies outside your medical organization using the following methods of data transmission?”
- Physicians who electronically receive PHI were defined as those who answered “yes” to either the “EHR (not eFax)” or “Web Portal (separate from EHR)” methods when asked, “Do you receive patient health information from other providers and public health agencies outside

your medical organization using the following methods of data transmission?”

- Physicians who electronically search for PHI were defined as those who answered “always,” “often,” or “sometimes” when asked, “How often do you electronically search for health information from sources outside of your medical organization when seeing a new patient or an existing patient who has received services from other providers?”

To allow for comparisons with the previous research, supplementary estimates were generated using these alternate definitions for physicians who electronically send, receive, and search for PHI that are consistent with those used in “State Variation in Electronic Sharing of Information in Physician Offices: United States, 2015” (6). These estimates are provided in [Tables I, II, and III](#) (with specific definitions provided as footnotes in each table) and allow for direct comparisons with this previous research study. Under these alternative definitions, it is possible for physicians to be counted as sending, receiving, or searching for PHI even though they have not actually sent, received, or searched for any of the specific PHI items listed. Because of this, percentages shown in the “Any” category in [Tables I–III](#) are less than 100%.

Note that this [Technical Notes](#) section contains no additional estimates for physicians who electronically integrate PHI, because the definition used in [Figure 3](#) of this report is consistent with a previous study, and is directly comparable (6).

Table I. Type of patient health information sent electronically by office-based physicians among physicians who send patient health information electronically (alternative definition): United States, 2015

| Type of patient health information | Percent (standard error) | Korn and Graubard 95% confidence interval | |
|------------------------------------|-----------------------------|--|------|
| | | Low | High |
| Any | 69.0 (2.3) | 64.3 | 73.5 |
| Referrals | 53.2 (2.4) | 48.3 | 58.0 |
| Laboratory results | 51.5 (2.4) | 46.7 | 56.3 |
| Medication lists | 50.1 (2.4) | 45.3 | 54.9 |
| Medication allergy lists | 48.8 (2.4) | 44.1 | 53.6 |
| Problem lists | 48.7 (2.4) | 43.9 | 53.5 |
| Summary of care records | 44.0 (2.4) | 39.3 | 48.8 |
| Registry data | 43.3 (2.4) | 38.6 | 48.2 |
| Imaging reports | 45.9 (2.4) | 41.2 | 50.7 |

NOTES: These estimates are based on physicians who electronically send patient health information, defined as those 1,178 respondents who answered that they used an electronic health record (EHR) (not eFax) or web portal (separate from EHR) when asked, "Do you send patient health information to other providers and public health agencies outside your medical organization using the following methods of data transmission?" This definition of physicians who electronically send patient health information is consistent with that used in previous research (see reference 6 in report). The original definition of physicians who electronically sent patient health information can be found in the Methods section of this report.

SOURCE: NCHS, National Electronic Health Records Survey, 2015.

Table II. Type of patient health information received electronically by office-based physicians among physicians who receive patient health information electronically (alternative definition): United States, 2015

| Type of patient health information | Percent (standard error) | Korn and Graubard 95% confidence interval | |
|--|-----------------------------|--|------|
| | | Low | High |
| Any | 74.0 (2.1) | 69.6 | 78.1 |
| Laboratory results | 60.7 (2.3) | 56.0 | 65.2 |
| Imaging reports | 50.9 (2.4) | 46.2 | 55.6 |
| Medication lists | 49.1 (2.4) | 44.4 | 53.8 |
| Referrals | 47.8 (2.4) | 43.2 | 52.6 |
| Summary of care records | 47.7 (2.3) | 43.1 | 52.4 |
| Medication allergy lists | 46.5 (2.3) | 41.9 | 51.2 |
| Problem lists | 46.2 (2.3) | 41.6 | 50.9 |
| Registry data | 38.6 (2.3) | 34.1 | 43.2 |
| Hospital discharge summaries | 34.2 (2.1) | 30.0 | 38.6 |
| Emergency department notifications | 28.3 (2.0) | 24.5 | 32.4 |

NOTES: These estimates are based on physicians who electronically receive patient health information, defined as those 1,201 respondents who answered that they used an electronic health record (EHR) (not eFax) or web portal (separate from EHR) when asked, "Do you receive patient health information from other providers and public health agencies outside your medical organization using the following methods of data transmission?" This definition of physicians who electronically receive patient health information is consistent with that used in previous research (see reference 6 in report). The original definition of physicians who electronically received patient health information can be found in the Methods section of this report.

SOURCE: NCHS, National Electronic Health Records Survey, 2015.

Table III. Type of patient health information searched for electronically by office-based physicians among physicians who search electronically for patient health information (alternative definition): United States, 2015

| Type of patient health information | Percent (standard error) | Korn and Graubard 95% confidence interval | |
|--|-----------------------------|--|------|
| | | Low | High |
| Any | 99.3 (0.3) | 98.6 | 99.7 |
| Medication lists | 92.1 (1.3) | 89.0 | 94.6 |
| Medication allergy lists | 90.8 (1.2) | 88.1 | 93.1 |
| Hospital discharge summaries | 82.7 (1.9) | 78.7 | 86.2 |
| Imaging reports | 62.1 (2.3) | 57.4 | 66.5 |
| Laboratory results | 51.5 (2.4) | 46.7 | 56.4 |
| Problem lists | 43.1 (2.4) | 38.4 | 47.9 |

NOTES: These estimates are based on physicians who electronically search for patient health information, defined as those 1,114 respondents who answered "always," "often," or "sometimes" to the survey question, "How often do you electronically search for health information from sources outside of your medical organization when seeing a new patient or an existing patient who has received services from other providers?" This definition of physicians who electronically search for patient health information is consistent with that used in previous research (see reference 6 in report). The original definition of physicians who electronically searched for patient health information can be found in the Methods section of this report.

SOURCE: NCHS, National Electronic Health Records Survey, 2015.

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